CHANGE IN VASCULAR TONE UNDER THE INFLUENCE OF HYPODYNAMIA

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Translation of: "Izmeneniye tonusa sosudov pod vliyaniem gipodinamii". In: Problemy Kosmicheskoy Meditsiny, Moscow, 1966, pp. 92-93

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16. Abstract

Before and after 10 days of hypodynamia, cardiograms from which the rate of propagation of pulse value (pwpr) was calculated were taken from test subjects, young well-trained athletes. Pwpr along elastic type vessels does not significantly change as a result of hypodynamia; pwpr along muscular type vessels drops sharply as a result of hypodynamia. A drop in the tone of muscle elements is concluded to be a logical consequence of prolonged hypodynamia.

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CHANGE IN VASCULAR TONE UNDER THE INFLUENCE OF HYPODYNAMIA

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This work was carried out jointly with the Department of /92 * Physiology of the Central Scientific Research Institute of Physical Culture (Department Head: Professor Korobkov, Laboratory Chief: Candidate in Biological Sciences A. A. Korobova), where experiments were performed on hypodynamia in which young well-trained athletes spent ten days in a horizontal position without moving.

In order to ascertain the influence of hypodynamia on vascular tone, tests were performed prior to the start of the experiment in which the subjects, in a state of rest, were subjected to a single recording on a polycardiograph using the "Kardireks" system; the electrocardiograms used the second standard lead and sphygomograms were also recorded from the radial artery and the tip of the middle finger. At the proper speed of paper transport, this made it possible to calculate the rate of propagation of the pulse value (pwpr) along the vessels of the elastic and muscular types.

A similar study was performed again using the same method /93 after the 10 days had elapsed during which the subjects were in an immobile state.

In analyzing the results and data, it was found that the pwpr along the vessels of the elastic type does not suffer significant changes as a result of 10 days of hypodynamia.

However, the vessels of the purely muscular type (arteries

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* Numbers in the margin indicate pagination in the foreign text.

of the wrist) considerably alter their elastic viscous state, resulting in a sharp change in pwpr along the vessels of the muscular type.

Our previous studies had shown that well-trained athletes have a pwpr along the muscular type of vessels which is very high and considerably (sometimes twice as much) in excess of the pwpr recorded for vessels of the muscular type in persons of the same age who did not take part in sports. We also found that the pwpr along vessels of the muscular type increases noticeably in conjunction with increased training.

The data of the subjects who were well-trained and were considered high-ranking athletes were found at the beginning of our experiments to have large pwpr figures along vessels of the muscular type, ranging from 630 to 880 cm per sec. with an average of 746 cm per sec.

Immediately following the hypodynamia, the pwpr in these same individuals along the vessels of the muscular type was between 430 and 730, with an average of only 518 cm per sec. This remarkable drop in the pwpr along the vessels of the muscular type was found in all eight subjects who were subjected to prolonged hypodynamia.

The decrease in pwpr along the vessels of the muscular type under the influence of hypodynamia is a regular phenomenon, since an increased tone of the muscular elements of the vascular walls is a necessary physiological mechanism for high physical activity in man, promoting the movement of the pulsing blood stream under conditions of intensive physical activity. Inasmuch as we understand tone to be a dynamic phenomenon associated with high

activity of contractile elements of the vascular wall, a significant drop in the tone of muscle elements in the vessels must be considered as a logical consequence of prolonged hypodynamia.